

market. As in the case of no fixed cost, cost-based mutual compensation allows the customers of BB and BA to enjoy competitive prices. The monopolist of A cannot artificially raise the price of BB or BA traffic by setting a high mutual compensation rate and transferring profits to an affiliate. Cost-based mutual compensation achieves the theoretical ideal of restricting monopoly power to the set of customers for which there are no alternatives and preventing the extension of monopoly power to potentially competitive markets through manipulation of interconnection compensation. With cost-based mutual interconnection, the opportunity for competition among half of the customers reduces total monopoly power in half. That contrasts with the case of mutual compensation without restrictions on the rate charged in which the opportunity for competition among half of the customers did not reduce monopoly power at all.

V. Practical Considerations in Designing an Interconnection Policy

Both existing policy toward international settlement rates and theoretical analysis support the goal of cost based compensation rates for jointly provided services. In the above examples, cost was a simple constant rate per minute. Unfortunately, the real world is not so simple and the actual definition and measurement of cost require care. For example, most telecommunication equipment is engineered for peak period usage. Because most of the cost of service

is related to the capacity of the plant rather than the actual number of minutes used, the true cost for peak period usage is much greater than the cost for off peak usage. The cost of carrying off-peak traffic may be very near zero. Any interconnection policy should provide feasible administrative and measurement mechanisms and should provide maximum freedom for innovations in service and pricing. Two practical approaches to the general principle of cost based mutual compensation should be considered.

A. Sender keep all

A particularly simple approach to mutual compensation is sender keep all. Under this arrangement, each company is obligated to terminate traffic for other companies and is entitled to have its traffic terminated by other companies. Each company bills its customers for its originating traffic and pays no compensation to any other company for terminating service.

Sender keep all is mutual compensation with the price of terminating service set at zero. It is economically efficient so long as the real cost of providing terminating service is low. The incentives for manipulation are reversed in this case compared to the previous cases of above-cost terminating rates. Under sender keep all, each company has an incentive to increase the efficiency of its operations in order to reduce its costs and to maximize its outgoing traffic relative to its incoming traffic because outgoing traffic is the most profitable.

Although sender keep all departs from the theoretical goal of cost based compensation by setting a below cost price for terminating service, there is less opportunity for manipulation than with the price of terminating service above cost. If traffic is balanced, the price is irrelevant. Decreasing the incentives for traffic manipulation will tend to increase the balance of the traffic and reduce the significance of the difference between cost and the zero compensation rate. With mutual compensation rates above cost, the monopolist has an incentive to send as much traffic as possible to its own affiliate and as little traffic as possible to the competitors of its affiliate. With sender keep all, the monopolist has no incentive to send traffic to an affiliate. The monopolist does have an incentive to refuse to accept terminating traffic, but the interconnection requirement implies an obligation to terminate any traffic that is presented.

B. Peak Usage Measurement

The recent NYNEX-Teleport interconnection arrangement provides an example of a combination of usage charges and sender keep all arrangements. The general form of the agreement is to establish a particular charge for a two-way channel of given capacity between the two companies. Traffic is measured at the busy hour each month and the relative measurements are used as an allocation factor for the established channel rate. If traffic is exactly

balanced, the payments to each company cancel out and the level of the established rate is irrelevant. If traffic is not balanced, and if Teleport, for example, sends more traffic to NYNEX than it receives from NYNEX at the busy hour, that imbalance is used to compute a net payment from Teleport to NYNEX.

The agreement is essentially a sender keep all arrangement for non-peak traffic. Because relative traffic is only measured at the peak hour, either company can increase its traffic to the other at non-peak times without affecting the charges due. For peak traffic, the agreement is essentially a per minute compensation scheme. An increase in peak period traffic from NYNEX to Teleport, for example, without a corresponding increase in the other direction, changes the financial flows between the companies in the same way that a per minute charge for peak terminating traffic would do.

The distinction between peak and off-peak traffic is beneficial for administrative simplicity and for economic efficiency. Costs are generally associated with peak traffic and therefore the effectively zero charge for terminating off-peak traffic is cost based.

While the structure of the NYNEX-Teleport agreement is beneficial for equating termination charges to cost during the off-peak period, it does not in itself solve the problem of increasing market power through high charges discussed in the previous sections. If the established price for a

channel of given capacity is set far above cost, then the company with market power could engage in the same kind of manipulation discussed above. For example, with a very high priced channel, NYNEX could choose to not terminate traffic through Teleport during the peak hour while Teleport would have little choice but to terminate traffic through NYNEX. That could cause Teleport to pay rates for termination that were high enough to reduce the benefits of competition.

If the established price for a channel of given capacity is near the real cost, then the NYNEX-Teleport arrangement provides an attractive model for general interconnection issues. It would approach a cost-based interconnection fee for both peak and off peak traffic, leading to economic efficiency and opportunities for pricing innovations.

VI. Conclusion

When the market is composed of segments that are monopolized and segments subject to competition, interconnection and compensation arrangements are critical to the development of effective competition. A good interconnection policy will allow effective competition in the potentially competitive segments of the market while a poor interconnection policy will allow the monopolist of part of the market to extend its monopoly into potentially competitive sectors of the market. This paper has shown that the theoretically correct policy is mutual compensation

at cost based rates and that mutual compensation alone is insufficient to limit monopoly power. A desirable interconnection policy should be closely related to the theoretically correct policy and also take account of the practical problems of administrative feasibility and of the definition and measurement of cost.

Several specific conclusions can be drawn from the analysis of this paper:

- (1) If there are no regulatory controls on compensation for interconnection, the monopolist of part of the market can extend its monopoly power to the entire market;
- (2) A mutual compensation policy without limits on the level of rates does not limit market power;
- (3) The level of rates under a mutual compensation policy is unimportant if and only if the level of incoming and outgoing traffic is exactly balanced. Because traffic levels will rarely, if ever, be exactly balanced, the level of rates will be an important factor in the viability of competition;
- (4) A mutual compensation policy with prices limited to the cost of service is the theoretically correct compensation policy. Mutual compensation with prices limited to the cost of service prevents the monopolist of part of the market from extending its market power to potentially competitive sectors of the market.

(5) Capacity charges rather than per minute charges allow attention to be focused on the cost of service at the peak load which is generally the real cost of service;

(6) "Sender keep all" is an administratively simple mutual compensation scheme with zero prices for terminating service. It is an attractive approximation to the theoretically correct policy of cost based prices when the incremental cost of terminating service is low.

APPENDIX

Brief Summary of Past Interconnection Compensation Efforts

Interconnection issues have played a crucial role in competitive viability and in pricing policy throughout the history of the telecommunication industry. Interconnection disputes began with the early efforts to expand market power in the telegraph industry through limits on interconnection rights and continued through the Bell companies' early twentieth century denial of interconnection to independent telephone companies, the development of legal rights to interconnection, the private line and CPE interconnection controversies of the 1970's, and the development and implementation of the access charge system during the 1980's.

The 1980 Computer II decision to remove CPE from Title II regulation included the decision to eliminate the support flows that had previously gone from CPE to other parts of the industry. Customers gained the right to interconnect any amount of CPE (so long as it met specified technical standards) to the public network with no specific interconnection charge. Customers still had to pay the tariffed local rates for service, but CPE was "carved off" from the public network. That decision was made in the context of a monopoly public network and a potentially competitive CPE component. Without the interconnection requirements, the monopoly local network provider could also

monopolize the CPE, but with the requirements, the CPE market could develop in a competitive way independently of the actions of the monopoly local network providers.

It would have been possible to apply the CPE model to long distance interconnection (allowing the competitors to interconnect at ordinary local rates as MCI originally requested in its Execunet service), but that would have eliminated the established system of revenue flows from long distance to local service. The decision first to allow AT&T to impose the ENFIA tariff rather than local rates for long distance interconnection, and then the development of the access charge system, implied a desire to maintain the system of revenue flows from long distance to local service. The access charge system together with the MFJ restrictions on BOC participation in long distance service allowed the long distance market to develop competitively without interference from the local exchange companies, but did not force prices to the true cost of service as normally happens in a competitive market.

Both the CPE and long distance controversies occurred in a market structure in which one party (the local exchange) was assumed to have monopoly power and the other party (the CPE user or long distance provider) was assumed to operate in a competitive market. Thus the policy concern was to ensure that the competitor could receive access to the monopolized market at an appropriate price. The international model provides a more equal example in which

both parties are assumed to have market power. So long as AT&T was the only U.S. carrier for international telephone traffic, it could bargain over the compensation scheme with monopoly entities in foreign countries on an equal basis. However, the beginning of competition in the U.S. for international calls increased the bargaining power of the foreign carriers. The foreign carrier was no longer restricted to dealing with AT&T for U.S. traffic but could agree to send traffic to the U.S. carrier that offered the foreign monopoly carrier the most favorable terms. This possibility created considerable concern at the FCC over whether the beginning of international competition in the U.S. would only benefit foreign carriers and not U.S. customers. Evan Kwerel's 1984 analysis of the international market concluded:

This paper raises serious questions about the wisdom of deregulating U.S. international telecommunications without considering whether this will increase the market power of foreign telecommunications authorities. Increased competition among U.S. suppliers of international telecommunications services is likely to result in a reduction in the U.S.'s share of the benefits from such services unless the U.S. government takes appropriate countermeasures.⁶

The concerns raised in Kwerel's 1984 paper later developed into extensive FCC efforts to prevent monopoly foreign carriers from taking advantage of their unequal bargaining position with competitive U.S. carriers. The

⁶ Evan Kwerel, "Promoting Competition Piecemeal in International Telecommunications," FCC, OPP Working Paper 13 (December 1984), p. 49.

Commission found that equal payment in each direction was inadequate protection against manipulation for a monopolist of one side and sought to bring the rates paid for international terminating service down to the level of cost.

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